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AUTHOR Stevens, Robert J.; And Others
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ABSTRACT

A year-long study determined the long-term effects of a comprehensive learning approach to elementary reading and writing instruction on students' achievement, attitudes, and metacognitive awareness. Subjects, 529 students in 29 second- through sixth-grade classes in a suburban Maryland school district, participated in the Cooperative Integrated Reading and Composition (CIRC) program in which they worked in heterogeneous learning teams on a series of reading and writing activities related to basal stories. Teachers also provided students with direct instruction on comprehension and metacomprehension strategies. Results indicated: (1) significant effects in favor of CIRC on standardized achievement measures of reading vocabulary, reading comprehension, and language mechanics; and (2) greater metacognitive awareness for the CIRC students at the end of the year than for their traditionally instructed peers. In addition, special education students who were mainstreamed into CIRC classes had higher achievement on standardized tests, and were more socially accepted by their peers, than were comparable special education students in traditional settings. (Five tables of data are included; 40 references, an index of reading awareness, and an attitude questionnaire are attached.) (Author/RS)

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Center for Research On Elementary & Middle Schools

Report No. 42

November, 1989

A COOPERATIVE LEARNING APPROACH TO ELEMENTARY READING AND WRITING INSTRUCTION: LONG-TERM EFFECTS

Robert J. Stevens, Robert E. Slavin and Anna Marie Farnish

The Johns Hopkins University

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Center for Research on Elementary and Middle Schools
The Johns Hopkins University
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Baltimore, Maryland 21218

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The Center

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This program focuses on improving the organizational performance of schools in adopting and adapting innovations and developing school capacity for change.

This report, prepared by the Elementary School Program, examines the effects of a full-year implementation of the Cooperative Integrated Reading and Composition program on students in second through sixth grades.

Abstract

A year-long study was conducted to determine the long-term effects of a comprehensive learning approach to elementary reading and writing instruction on students' achievement, attitudes, and metacognitive awareness. In the Cooperative Integrated Reading and Composition (CIRC) program, students in second through sixth grade worked in heterogeneous learning teams on a series of reading and writing activities related to basal stories. Teachers also provided students with direct instruction on comprehension and metacomprehension strategies.

The study found significant effects in favor of CIRC on standardized achievement measures of reading vocabulary, reading comprehension, and language mechanics. The CIRC students also exhibited greater metacognitive awareness at the end of the year than did their traditionally instructed peers. Finally, special education students who were mainstreamed in CIRC classes had higher achievement on standardized tests, and were more socially accepted by their peers than were comparable special education students in traditional settings.

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The Cooperative Integrated Reading and Composition (CIRC) program is a cooperative learning approach to teaching elementary reading and language arts. The CIRC program produced greater achievement gains on standardized tests than traditional instruction in two studies in grades three and four which lasted 12 and 24 weeks respectively (Stevens, Slavin, Madden, & Farnish, 1987). This study extends the examination of the effectiveness of the CIRC program to a wider range of elementary grades and investigates the impact over an entire school year.

Background

The development of the CIRC program proceeded from an analysis of the problems in traditional classroom instruction in reading, writing and language arts. Basic and applied research was then integrated to build a classroom instruction model based upon state-of-the-art knowledge in classroom instruction, reading, writing and language arts.

Classroom Instruction

The classroom instruction revolves around the use of cooperative learning strategies derived from previous research at The Johns Hopkins University (Slavin, 1986). All activities in the CIRC program use the same instructional cycle.

1. *Teacher instruction.* The initial instruction always comes from the teacher, either in instructional groups (reading groups) or in whole class instruction.

2. *Team practice.* Students work in four- or five-member, mixed-ability learning teams to master the material presented by the teacher. Students work with the entire team, or with partners to complete practice activities and check each other, discuss answers and arrive at consensus responses to questions, drill each other, and so on. Teammates also assess one another to make sure each individual will succeed on the assessments.

3. *Individual assessment.* Students are individually assessed on their learning of information or new skills that were presented.

4. *Team recognition.* Students' scores on individual assessments are summed to form team scores. Teams which meet specific preestablished criteria receive certificates or rewards for their achievement.

The cycle of instruction uses a direct instruction approach (Rosenshine & Stevens, 1986) with cooperative learning processes which use peers as instructional and motivational resources. The idea is to give students an incentive to do a good job helping their teammates learn. Because the team succeeds only when all of the individuals on the team have learned the material, students take responsibility for one another's achievement as well as their own. In this way, students help each other and provide elaborated explanations of concepts or skills, which improves the comprehension of both students (Dansereau, 1985; Stevens, Slavin, & Farnish, in preparation; Webb, 1985). In applying cooperative learning principles to reading, writing, and language arts instruction, different forms of cooperative learning are used to meet the diverse objectives of reading comprehension, vocabulary, spelling, writing, and language mechanics; however, all instruction uses the cycle of instruction described above.

Reading

Follow-up activities. One major focus of the CIRC program reading activities is to make more effective use of follow-up time by having students work cooperatively on prescribed

improve students' comprehension (e.g., Brown & Palincsar, 1982; Day, 1980; Palincsar & Brown, 1984; Paris, Cross, & Lipson, 1984; Raphael, 1980; Stevens, 1988).

Although many studies have demonstrated that explicit instruction can improve students' comprehension, few have attempted to assess the degree to which students' metacognitive awareness and control have changed as a result of instruction in strategic processes (Paris, Wasik, & Van der Westhuizen, in press). Metacognitive awareness and control of strategies is necessary if students are to integrate strategies into their repertoire and use them in appropriate situations, yet be flexible enough to generalize their use to new situations (Baker & Brown, 1984; Paris & Jacobs, 1984). For students to be independent, strategic readers they need to develop an awareness of their comprehension strategies, the ability to use strategies appropriately, and the knowledge of what to do when they encounter difficulty comprehending (Baker & Brown, 1984; Paris & Jacobs, 1984; Paris, et.al., 1984).

Writing and Language Arts

Another objective of the CIRC program is to integrate language arts and writing instruction, and to use a writing process approach. Typically, language arts instruction in elementary school allocates little time to writing activities, but students spend a good deal of time learning language mechanics skills in isolation (Bridge & Heibert, 1985; Graves, 1978). Recent research and program development has shown that a writing process approach--using a cycle of planning, drafting, revising, editing, and publishing compositions--is a more effective approach to language arts instruction (Calkins, 1983; Graves, 1983; Raphael, Englert, & Kirschner, 1986). In this approach writing becomes the focus of instruction. Students are taught the essentials of style, coherence, and genre, and language mechanics instruction is integrated into their writing activities.

Elements of the CIRC Program

The CIRC program consists of four main elements: grouping strategies, basal-related activities, direct instruction in comprehension strategies, and integrated writing and language arts. Instruction in each area follows the cycle of instruction presented previously. (See Stevens, et. al., 1987 for a more thorough description of the CIRC program.)

Grouping strategies

Students are assigned to reading groups according to their reading instructional level, as determined by the teacher. In general, the teacher provides initial instruction in reading related activities separately for each group.

Students are also assigned to pairs (or triads) within their reading groups, and then each pair is teamed with another pair from a different reading group. For example, a team might be composed of two students from the top reading group and two from the low group. Team members receive points based on their individual performances on all quizzes, compositions, and book reports, and these points are contributed to form a team score. Teams that meet a minimum average criterion of 90% on all activities in a given week are designated "superteams" and receive attractive certificates; those which meet an average criterion of 80-89% are designated "greatteams" and receive less elaborate certificates. As noted, research on the use of heterogeneous teams that are rewarded on the basis of individual members' performance has established the instructional effectiveness of this approach (Slavin, 1983a, b).

Basal-related Activities

Students use their regular basal readers. Basal stories are introduced and discussed in teacher-led reading groups, which meet for about 20 minutes each day. During reading groups the teacher introduces new vocabulary, sets the purpose for reading, discusses the story after students have read it, and so on.

After stories are introduced, students are given a series of follow-up activities to do as teams or partners. The seatwork activities are directly related to the teacher-directed instruction of the reading group and to the basal stories. The goal is to make the activities more engaging and useful. The activities are as follows:

a. *Partner reading*. Students read the story silently first, and then orally with their partners. During oral reading they take turns reading aloud, alternating readers after each paragraph. As one partner reads, the listener follows along and corrects any errors the reader makes. This repeated reading of the story gives the students practice in decoding the words in context, which has been found to contribute to decoding ability (Dahl, 1979; Samuels, 1979). Partner reading also gives students a great deal of oral reading practice and enables the teacher to assess student performance by circulating and listening, without having to waste the time of other students in a reading group.

b. *Treasure Hunts*. Students are given questions related to the story, called Treasure Hunts, which focus on comprehension of what happened in the story. The Treasure Hunts use questions which are related to the story structure to improve students' comprehension (Fitzgerald & Spiegel, 1983; Short & Ryan, 1982). For example, questions about narrative stories focus on the narrative structure: main characters, setting, problem, resolution. Students are also asked to predict how the problem might be solved and to clarify why characters behaved in a particular way, as prediction and clarification questions improve comprehension (Palincsar & Brown, 1984).

c. *Words out loud*. Students are given a list of new or difficult words used in the story. They practice these words with their partners until they are able to say them smoothly and accurately. The goal is to develop automaticity of the new words so they will not interfere with students' comprehension of the story (LaBerge & Samuels, 1974; Perfetti, 1985).

d. *Word meaning*. Students are given a list of story words which are new in their speaking vocabularies and asked to look them up in a dictionary, paraphrase the definition, and write a sentence for each that shows the meaning of the word (e.g., "An *octopus* grabbed the swimmer with its eight long legs," not "I have seen an *octopus*").

e. *Story retelling*. After reading the story and discussing it in their reading group, students summarize the main points of the story to their partners. They put the events in their own words, briefly restating them to their partners. Summarizing and paraphrasing content in one's own words has been found to improve the comprehension of what has been read (Doctorow, Wittrock, & Marks, 1978; Weinstein, 1982).

f. *Story-related writing*. After reading the story, students are given a writing topic that requires them to respond in a few paragraphs to the story they have just read. They use a truncated form of the writing process used in the writing and language arts component to write their brief compositions. This activity allows students to elaborate on what they have read and relate it to their prior knowledge or previous experiences (Wittrock, 1981).

Tests. At the end of the activity cycle for a story, students are given a comprehension test about the story, are asked to write meaningful sentences for vocabulary words, and are asked to read the word list aloud to the teacher. Students complete all of these tests independently. The test scores are used to determine team scores, as described previously.

Direct Instruction in Comprehension Strategies

One day each week, students receive direct instruction on specific reading comprehension skills such as identifying main ideas, drawing conclusions, and comparing and contrasting ideas. The instruction provides students with comprehension-fostering strategies and metacognitive strategies like those developed in basic and applied research studies in reading comprehension (Brown & Palincsar, 1982; Palincsar & Brown, 1984; Paris, Cross, & Lipson, 1984; Raphael, 1980; Stevens, 1988).

The teacher first describes the strategy and when and why it is helpful for improving comprehension; then models the strategic process and shows students how to monitor the effectiveness of this use of the strategy. Students then practice the use of the strategy on comprehension worksheets or games with other team members. They first complete a portion of the activities cooperatively, arriving at one consensus answer for the team. Then they work on other practice activities independently, with their teammates checking this work and providing corrective feedback.

Integrated Writing and Language Arts

During language arts time, teachers use a specific writing and language arts curriculum that focuses instruction on a writing process approach. Students are taught the components of the writing process--planning, drafting, revising, editing, and publishing--and how to use their peers and the teacher as resources for ideas and feedback to help them improve their composition. Teachers also provide direct instruction on specific writing activities related to how to improve coherence, how to write compositions of various types or genres, and how to increase readers' interest in their writing style. Language mechanics activities are integrated with the writing activities, with a focus on improving students' writing rather than as separate skills.

Other Elements of CIRC

In addition to the four main elements just described, the CIRC program institutes independent reading at home and mainstreaming of special education students.

Independent reading. Students in CIRC have one standing homework assignment every night: independent reading for 20 minutes from a book of their choice. Typically, students select books from the school library for this activity. Every two weeks they complete either a written or oral book report on their independent reading, and points for the book report are used in their team score.

Mainstreaming special education students. One of the goals of the CIRC program is to provide an instructional process in which special education students can be effectively mainstreamed for reading and language arts instruction. Resource room teachers discontinue their practice of pull-out remedial reading instruction for learning disabled students. Instead, the resource room teacher makes instructional groups out of all the identified students, regardless of grade, and takes each group of special education students at a common ability level into the regular education classroom, where team teaching occurs, with the regular education teacher teaching the rest of the class.

The mainstreamed students are assigned to cooperative learning teams within the regular education class, so they interact on academic tasks with other students and gain the potential benefits of those interactions, as described previously. Also, cooperative learning processes provide a way for special education students to become socially mainstreamed as well through their interactions with their teammates in the classrooms.

Research Plan

The purpose of this study was to extend the previous research on the effectiveness of the CIRC program (see Stevens, et. al., 1987). The two previous studies found that CIRC was effective in increasing students' achievement in reading and language arts in third and fourth grade. One goal of this research was to extend the CIRC program into second, fifth, and sixth grade.

Second grade presented instructional problems, particularly in integrating more decoding activities into the program and having younger students work cooperatively and provide one another with substantive feedback during various cooperative activities. On the other hand, extending into fifth- and sixth-grade raised instructional issues relating to the degree to which various activities would sufficiently extend these students' comprehension. Also of concern was

the degree to which older students would cooperate, and whether they would find the team scores and rewards meaningful. Previous research has shown cooperative learning processes to be effective with students through high school and college (Dansereau, 1985; Slavin, 1983b), but this was the first application of these processes at higher elementary grade levels in reading and language arts.

Another goal of this study was to determine the effects of the CIRC program in a long-term implementation. The first two evaluations of CIRC lasted for 12 and 24 weeks respectively (Stevens, et. al., 1987). Although these studies support the program's effectiveness as a programmatic adoption rather than just an experimental treatment, a full-year implementation would provide more powerful evidence. Also, a full-year implementation of CIRC would reduce or eliminate the novelty of the program and thus any potential Hawthorne effect.

A final goal of this study was to investigate the degree to which the strategic instruction in comprehension has an impact on students' metacognitive awareness and control over those processes. It is thought that improved metacognition is important for long-term and flexible use of strategies (Baker & Brown, 1984; Paris & Jacobs, 1984). We will investigate this relationship by examining students' metacognition and their achievement gains in reading comprehension.

Method

Subjects and Design

The subjects were 529 students in second-through sixth-grade in 29 classes in a suburban Maryland school district. Fifteen experimental classes in three schools were matched on California Achievement Test Total Reading pretest scores with 14 classes in three control schools. The student populations in these schools ranged from 0 to 10 percent minority students (mean of 5.2%), and from 6 to 13 percent disadvantaged students (mean of 9%). Teachers volunteered to participate in the study, and teachers in the control group were offered the option of receiving

training at the conclusion of the study. The treatments were implemented during the entire 1987-88 academic year.

Treatments

Control. The control teachers continued using their traditional methods and curriculum materials. In reading, this usually consisted of using a basal series in two or three reading groups. Reading group time usually consisted of vocabulary instruction, story discussion, and a brief opportunity for oral reading turns. Typically students returned to their seats and completed the story by reading it silently and then they answered a few questions about the story. Students spent the majority of the seatwork time completing a variety of workbook and worksheet activities and "skills." During language arts time teachers typically instructed the whole class on language mechanics activities. Approximately once or twice a week the teacher instructed the whole class on a writing topic and the students spent the remainder of the time in those periods on a writing task related to the instruction.

Experimental. The experimental teachers were trained in the CIRC program as described above. The training consisted of two full-day training sessions, one for reading and one for writing and language arts. During the training, teachers were given explanations of how to do the classroom processes and what the rationale was behind them. Program elements were simulated for the teachers, with the trainer acting as the "teacher" and the teachers acting as "students." The teachers also received a detailed manual of the CIRC program.

During the initial four weeks of the implementation, project staff observed the experimental teachers three or four times a week to monitor their implementation. The staff coached the teachers by providing them feedback on the implementation and answering their questions about the CIRC program. We particularly emphasized the implementation of the cooperative learning processes and the teacher-led direct instruction. Periodically the project staff held after-school

meetings to provide further feedback and discussions of implementation questions with the teachers. As teachers became more proficient with CIRC, the observations occurred less frequently and at more random intervals.

Measures

Achievement pretests. Standardized achievement test scores were used to determine the equivalence of the treatment groups' initial ability. The California Achievement Test Total Reading and Total Language scores were obtained from the district's records. The district administered achievement tests during the fall of third and fifth grade; thus third- and fifth-graders' pretests were recent but fourth- and sixth-graders' pretest scores were a year old. The district did not test second-graders, so the teachers administered the California Achievement Test to second-graders in the fall as a pretest for this study.

Achievement posttests. In May all teachers in the experimental and control treatments administered the California Achievement Test, using appropriate levels and a different form than that used in the pretest. Students completed the Reading Vocabulary, Reading Comprehension, Language Mechanics, and Language Expression subtests.

Metacognition measure. Improved metacognitive ability often is a goal of instructional interventions but is seldom directly measured as an outcome; rather, it is usually inferred through reading comprehension measures (Paris, Wasik and van der Westhuizen, in press). Jacobs and Paris (1987) have developed an informal assessment of metacognition called the Index of Reading Awareness. The index measures students' awareness of comprehension strategies, their knowledge of which stategies are appropriate for specific situations, and their knowledge of what to do if their comprehension is flawed. Previous research has shown that the Index of Reading Awareness is an effective measure of changes in metacognition resulting from instruction and is sensitive to developmental differences of metacognition (Jacobs & Paris, 1987).

A slightly modified version of the Index of Reading Awareness* was used as a pre- and posttest measure of students' metacognition. The index is twenty multiple choice questions, each with three responses. The responses are scored as zero, one, or two, depending on the level of metacognitive awareness indicated by that response (see questionnaire and response values in Appendix 1). The index is subdivided into four subscales which measure four major metacognitive activities: self-evaluation, planning, self-regulation, and conditional knowledge (Jacobs & Paris, 1987). This measure was not used with second-grade students because its readability was too difficult for those students.

Attitude measures. Students were given brief attitude questionnaires as pre- and posttest measures of their attitudes toward their major subjects (see Appendix 2). The questions asked students 1) to list their three favorite subjects, and the three subjects they felt were their best subjects; and 2) to rate each subject in a multiple choice format ranging from "I like it a lot" to "I don't like it."

The attitude measure was used in third-grade through sixth-grade but not in second-grade, again due to the readability level.

Sociometric measure. The students were given a sociometric measure which asked them to list their best friends in the class. This measure was used to determine the degree to which cooperative learning processes had an impact on the peer relations in the classrooms. The sociometric measure was also used only in grades 3 through 6.

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*Four of the original questions were changed to better reflect reading basal stories and the predominance of narratives.

Results

Implementation

Following the first month of implementation, teachers were observed periodically throughout the duration of the study, at a minimum of once every two weeks, to maintain the fidelity of the program in the classrooms. Teacher variations in the presentation of instruction (e.g., new vocabulary, story discussion, writing activities) were accepted and encouraged, provided that the adaptations met the goals of the CIRC materials and processes outlined in the teacher's manual. We insisted, however, that the teachers used the cooperative learning processes described for each of the components. These standards were made clear during training, and subsequent observations indicated that although teachers did vary some of their instructional procedures, the prescribed cooperative interactions between students were evident in each of the components.

Analyses

The posttests were analyzed by adjusting for students' initial achievement, using either Total Reading or Total Language pretest scores, in random-effects, nested analyses of covariance (ANCOVA's). In these analyses, class was nested with treatment and the mean square of treatments were compared to that for classes, with the degrees of freedom associated to the number of classes, not the number of students. All analyses used standardized achievement test scores.

Because the study encompassed a number of grade levels, analyses were conducted that entered grade and treatment as independent variables to determine if there was a significant grade by treatment interaction. Also, students were divided into three achievement levels (high, middle, low) based upon their initial achievement. Individual-level ANCOVA's were conducted with achievement level and treatment as independent variables to determine if there was a significant ability by treatment interaction.

Achievement pretests. As noted, experimental and control classes were matched initially on California Achievement Test Total Reading and Total Language scores. No significant pretest differences between the groups were found on either of these measures.

Achievement posttests. The class-level ANCOVA's found highly significant differences favoring the experimental group on three of the four standardized tests: reading vocabulary {$F(1, 27) = 18.9$, $p<.01$}, reading comprehension {$F(1, 27) = 14.4$, $p<.01$}, and language mechanics {$F(1, 27) = 11.4$, $p<.01$}. There were no significant differences on the language expression test {$F(1, 27) < 1.0$}. The standard score means and effect sizes are presented in Table 1. There were no significant grade by treatment interactions, so the data were collapsed across grade levels to investigate the treatment effects. For the collapsed means, the effect sizes (difference of the treatment means divided by the control standard deviation) of the significant results ranged from .25 to .29 standard deviations.

Table 1 About Here

An inspection of the posttest means by grade level shows the treatment effects did vary at different grades (see Table 1) even though there were no significant grade by treatment interactions. For the three outcome measures that yielded significant treatment effects, the effect sizes in second- through fifth-grade ranged from .19 to .37 in reading vocabulary, from .15 to .36 in reading comprehension, and from .30 to .62 in language mechanics. All these effects favored the experimental group. However, the sixth grade data show little or no difference between the treatment groups.

The posttest grade equivalent scores for the achievement tests are summarized in Table 2. In general, the grade equivalent means show that both treatment groups are at or above grade level for end-of-year testing. The experimental students consistently attained grade equivalent averages above that of control students.

Table 2 About Here

An investigation of the ability by treatment interaction was conducted by looking at the interaction between initial achievement level and treatment. There were no significant interactions between achievement level and treatment.

Metacognition. There were no significant differences between the treatment groups on premeasures of the students' level of metacognitive knowledge as measured by the Index of Reading Awareness. The class-level analyses indicated significant posttest differences on the metacognition score in favor of the experimental group {$F(1, 20) = 10.9$, $p<.01$}. There were no significant grade by treatment interactions on the metacognition measure, but the means presented in Table 3 reflect a developmental trend, with older students scoring higher than younger students.

The Index of Reading Awareness was evaluated to determine its test-retest reliability and internal consistency. The intercorrelation of the pretest and posttest was .73, and the internal consistency (coefficient alpha) was .69. Both measures of reliability are within acceptable levels for use in experimental research (Gronlund, 1977).

Table 3 About Here

Attitude measures. There were no significant pretest or posttest differences between the treatment groups on the attitude measures. Specifically, there were no significant differences in students' attitudes toward reading, writing, or mathematics.

Sociometric measure. There were significant posttest differences between the treatments in the number of friends the students listed. A class-level analysis indicated a highly significant difference {$F(1, 20) = 7.38$, $p = .01$} in favor of the experimental group. Students in CIRC listed an average of 8.4 friends, whereas students in traditional classes listed an average of 6.6 friends. There were no significant grade by treatment interactions on this outcome measure.

Special Education Students

The data for students who received special education or remedial reading services were analyzed separately to determine the impact of mainstreaming them through the use of cooperative learning processes.

The data are summarized in Table 4, and grade equivalent scores are presented in Table 5. These students were primarily diagnosed as learning disabled students. The special education students in the control group typically received their instruction either in a self-contained classroom or through pull-out instruction from the resource teacher.

Tables 4 & 5 About Here

Pretests. There were no significant pretest differences between the two treatment groups in this subsample.

Posttests. Individual level ANCOVAs of the achievement data for special education students indicated significant effects in favor of the experimental group on Reading Vocabulary {$F(1, 35) = 13.4$, $p = .001$}, and Reading Comprehension {$F(1, 35) = 4.36$, $p = .05$}. There were no significant differences on any other standardized measures. The small number of special education students at each grade level limited the ability to do analyses by grade.

There were no significant differences between the treatment groups on measures of special education students' attitudes or metacognitive knowledge.

Sociometric measure. The sociometric measure was used to determine the social integration of special education students. This was determined by comparing the frequency with which mainstreamed special education students were selected as friends by their regular education peers. Special education students in CIRC were selected more frequently on the average (4.9 times per class) than were special education students in traditional classes (3.7 times). These differences were not statistically significant, largely due to the small sample size. However, the effect size for the sociometric measure was .43.

Discussion

The results of this year-long study support the effectiveness of the CIRC program in producing significantly better reading and language achievement of students in second through sixth grade. The consistency and magnitude of the effects, along with the fact that they replicate previous results (Stevens, et. al., 1987), underscore the importance of the differences in favor of the CIRC program.

In reading, the standardized achievement results indicate effects consistently in favor of CIRC, with effect sizes ranging from .05 to .37 in vocabulary and from .02 to .36 in comprehension. Except for sixth grade, the results indicate that students in CIRC generally achieve about a quarter of a standard deviation higher in reading than do their peers in traditional classes. These

results are very consistent with those found in two previous field experiments where the effect sizes favoring CIRC were .11 and .17 in vocabulary achievement and .35 and .19 in comprehension achievement (Stevens, et.al. 1987).

The inconsistent results in sixth grade are somewhat puzzling. The CIRC students' initial achievement was considerably lower than that of the traditional classes (see Table 1). These initial differences, along with the small sixth-grade sample (one control class and one and a half experimental classes) suggest that additional research with a larger, more equivalent sample of sixth-grade students is needed to evaluate CIRC at that grade level.

The results in language arts are less consistent across the three grades tested. In language mechanics, CIRC students in third, fourth, and fifth grade clearly outperformed those in traditional classes, with effect sizes ranging from one-third to nearly two-thirds of a standard deviation. These results are very similar to previous studies which found effects on language mechanics favoring CIRC students by approximately one-third of a standard deviation (Stevens, et. al., 1987). However, the results on language expression were less consistent and smaller. CIRC students in third and fourth grade achieved nearly a quarter standard deviation higher than their peers, but students in fifth grade performed slightly lower.

The results indicate that the reading activities in CIRC do more than simply improve students' ability to answer questions about isolated comprehension skills, as measured by achievement tests. The CIRC activities also improve students' ability to use and monitor comprehension strategies, which not only improves their ability to answer discrete questions about what they've read, but also improves their executive comprehension processes. The significant effects found on the Index of Reading Awareness indicate that CIRC students developed greater metacognitive knowledge and control than students in more traditional reading instruction. As measured by this Index, students in CIRC exhibited more awareness of their cognitive activity in the areas of self-evaluation, planning, self-regulation, and conditional

knowledge. These processes have utility across a wide-range of reading contexts, and develop independence and self-control on the part of the reader (Baker & Brown, 1984; Paris, et. al., 1984).

The sociometric measures indicate that students develop better peer relations using the cooperative learning processes of the CIRC program. In CIRC, students have structured opportunities to work together to attain a common goal. Over a year's time, students change partners and learning teams often enough to eventually work with most or all of their classmates on cooperative learning activities. While completing the learning tasks, students learn about each other, which helps them develop better peer relations. These results are very consistent with a large body of research that shows that cooperative contact between students has a positive impact on peer relations and school friendships (Johnson & Johnson, 1981; Slavin, 1983a; Slavin & Hansell, 1983). The positive peer relations resulting from the CIRC program are indicated by the significantly greater number of friends listed by students in CIRC than by those in traditional instruction.

This study also shows that CIRC is an extremely effective way to mainstream special education students into the regular classroom. Special education students in CIRC performed significantly better than their nonmainstreamed peers. The CIRC program provides a structure that accommodates the increased academic diversity of the classroom brought on by mainstreaming. Remedial reading and resource room teachers were able to teach subgroups of students within the regular class on materials that were well integrated with what regular education students were doing. The teachers also were able to develop sufficiently high expectations for the mainstreamed students, both academically and behaviorally, helping them become better integrated into the regular classroom environment.

Yet true mainstreaming goes beyond academics. Mainstreamed students need a classroom environment that will also promote their social development and acceptance. The sociometric

results of this study indicate CIRC accomplished this by producing better peer relations between special education and regular education students. In CIRC classes, regular education students more frequently selected a mainstreamed student as a friend. By working with special education students in a mainstreamed cooperative learning structure, regular education students more readily accepted special education students into the social and academic milleau of the classroom.

The results reported here demonstrate the effectiveness of a multi-faceted cooperative learning approach to teaching reading and language arts. In particular, the results indicate that an effective program can increase student achievement in reading and language arts, and at the same time increase students' knowledge and awareness of their own comprehension processes. The results also indicate that mainstreaming mildly-handicapped students through CIRC can be effective in increasing their achievement and their social acceptance by regular education students.

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Table 1

Standardized Achievement Measures
Means, Standard Deviations and Effect Sizes

		CIRC	Control	E.S.
Collapsed Across Grades				
Pretests				
	Total Reading	.00 (.99)	-.02 (1.00)	
	Total Language	.02 (.98)	-.01 (1.01)	
Posttests				
	Reading Vocabulary	.13 (.92)	-.19 (1.07)	.29
	Reading Comprehension	.10 (.96)	-.16 (1.04)	.25
	Language Mechanics	.13 (.95)	-.17 (1.07)	.28
	Language Expression	.04 (.98)	-.07 (1.02)	.11
N		266	263	
Grade 2				
Pretests				
	Total Reading	.00 (.95)	.00 (1.07)	
Posttests				
	Reading Vocabualry	.14 (.81)	-.18 (1.18)	.27
	Reading Comprehension	.16 (.92)	-.20 (1.07)	.34
N		77	58	
Grade 3				
Pretests				
	Total Reading	.01 (.99)	-.01 (1.04)	
	Total Language	-.05 (1.03)	.05 (.99)	
Posttests				
	Reading Vocabulary	.07 (.96)	-.13 (1.07)	.19
	Reading Comprehension	.08 (.86)	-.12 (1.21)	.16
	Language Mechanics	.29 (.89)	-.35 (1.04)	.62
	Language Expression	.12 (.95)	-.14 (1.06)	.24
N		33	20	
Grade 4				
Pretests				
	Total Reading	.08 (.93)	-.08 (1.07)	
	Total Language	.10 (.90)	-.16 (1.13)	
Posttests				
	Reading Vocabulary	.18 (.93)	-.20 (1.04)	.37
	Reading Comprehension	.18 (.94)	-.19 (1.03)	.36
	Language Mechanics	.14 (.91)	-.22 (1.11)	.32
	Language Expression	.08 (.98)	-.13 (1.03)	.20
N		69	66	

Table 1 (continued)

Standardized Achievement Measures
Means, Standard Deviations and Effect Sizes

Grade 5				
Pretests				
	Total Reading	-.01 (.91)	.01 (1.06)	
	Total Language	.03 (1.04)	-.03 (.97)	
Posttests				
	Reading Vocabulary	.15 (.91)	-.10 (1.05)	.24
	Reading Comprehension	.08 (1.02)	-.05 (.98)	.13
	Language Mechanics	.16 (.93)	-.15 (1.04)	.30
	Language Expression	-.06 (.99)	.05 (1.02)	-.11
N		64	93	
Grade 6				
Pretests				
	Total Reading	-.10 (1.07)	.09 (.95)	
	Total Language	-.04 (.99)	.05 (1.02)	
Posttests				
	Reading Vocabulary	.03 (.97)	-.02 (1.05)	.05
	Reading Comprehension	.01 (1.04)	-.01 (.98)	.02
	Language Mechanics	.02 (.98)	-.01 (1.00)	.03
	Language Expression	-.01 (.97)	.00 (1.02)	-.01
N		23	26	

Table 2

Achievement Posttest
Grade Equivalent Means

	Posttest	CIRC	Control
Grade 2			
	Reading Vocabulary	3.28	3.05
	Reading Comprehension	3.28	2.86
N		77	58
Grade 3			
	Reading Vocabulary	3.63	3.43
	Reading Comprehension	3.44	3.26
	Language Mechanics	4.47	3.49
	Language Expression	3.61	2.91
N		33	20
Grade 4			
	Reading Vocabulary	5.21	4.59
	Reading Comprehension	5.28	5.01
	Language Mechanics	5.27	4.74
	Language Expression	4.69	4.59
N		69	66
Grade 5			
	Reading Vocabulary	6.24	5.68
	Reading Comprehension	6.59	6.23
	Language Mechanics	7.38	6.09
	Language Expression	5.92	5.75
N		64	93
Grade 6			
	Reading Vocabulary	7.13	6.80
	Reading Comprehension	7.10	7.00
	Language Mechanics	7.04	6.94
	Language Expression	6.64	6.70
N		23	26

Table 3

Index of Reading Awareness:
*Posttest Means**

Grade	CIRC	Control
Collapsed	29.33 (4.78)	28.77 (4.60)
3	27.24 (5.28)	26.58 (4.61)
4	29.22 (4.45)	28.38 (4.36)
5	30.10 (5.04)	29.21 (4.65)
6	30.64 (3.80)	29.97 (4.73)

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* The questionnaire consists of 20 questions each with three alternative choices. Choices are scored from 0 to 2, with 2 being the high score. Total scores possible range from 0 to 40.

Table 4

Standardized Achievement : Means and Standard Deviations
Special Education Students

		CIRC		Control	
Collapsed Across Grades					
Pretests					
	Total Reading	-1.46	(.54)	-1.18	(.90)
	Total Language	-1.51	(.79)	-1.30	(1.09)
Posttests					
	Reading Vocabulary	-1.04	(.62)	-1.33	(1.07)
	Reading Comprehension	-1.08	(.56)	-1.26	(1.01)
	Language Mechanics	-1.11	(.73)	-1.28	(.69)
	Language Expression	-1.31	(1.21)	-1.45	(1.01)
N		16		22	
Grade 2					
Pretests					
	Total Reading	-1.60	(.04)	-1.10	(.10)
Posttests					
	Reading Vocabulary	-.97	(.39)	-1.85	(.11)
	Reading Comprehension	-1.11	(.30)	-2.18	(.34)
N		3		2	
Grade 3					
Pretests					
	Total Reading	-1.02	(.57)	-1.06	(.61)
	Total Language	-1.42	(.64)	-1.09	(.29)
Posttests					
	Reading Vocabulary	-.84	(.38)	-1.23	(.21)
	Reading Comprehension	-.64	(.49)	-1.58	(.13)
	Language Mechanics	-.81	(.41)	-1.04	(.23)
	Language Expression	-1.02	(.57)	-1.42	(.17)
N		3		2	
Grade 4					
Pretests					
	Total Reading	-1.59	(.54)	-1.42	(.81)
	Total Language	-1.56	(.77)	-1.55	(.67)
Posttests					
	Reading Vocabulary	-.93	(.61)	-1.58	(.57)
	Reading Comprehension	-1.26	(.71)	-1.21	(.30)
	Language Mechanics	-1.24	(.41)	-1.34	(.10)
	Language Expression	-1.67	(.65)	-2.20	(.40)
N		3		5	

Table 4 (continued)

Standardized Achievement : Means and Standard Deviations
Special Education Students

Grade 5			
Pretests			
	Total Reading	-1.25 (.28)	-1.33 (.94)
	Total Language	-1.54 (1.03)	-1.54 (.62)
Posttests			
	Reading Vocabulary	-.70 (.43)	-1.31 (1.03)
	Reading Comprehension	-.80 (.43)	-1.23 (.86)
	Language Mechanics	-1.13 (.71)	-1.53 (.58)
	Language Expression	-1.02 (.92)	-1.19 (.78)
N		4	10
Grade 6			
Pretests			
	Total Reading	-1.94 (.33)	-.48 (1.12)
	Total Language	-1.78 (.51)	-.82 (.88)
Posttests			
	Reading Vocabulary	-1.25 (.20)	-.72 (1.56)
	Reading Comprehension	-1.23 (.58)	-.65 (1.62)
	Language Mechanics	-1.35 (.66)	-.84 (1.22)
	Language Expression	-1.54 (.83)	-1.20 (1.06)
N		3	3

Table 5

Achievement Posttest: Special Education Students
Grade Equivalent Means

	Posttest	CIRC	Control
Grade 2			
	Reading Vocabulary	2.65	2.30
	Reading Comprehension	2.56	2.22
N		3	2
Grade 3			
	Reading Vocabulary	2.83	2.75
	Reading Comprehension	2.89	2.36
	Language Mechanics	3.00	3.55
	Language Expression	2.52	2.34
N		3	2
Grade 4			
	Reading Vocabulary	3.13	2.98
	Reading Comprehension	3.32	3.53
	Language Mechanics	3.15	3.08
	Language Expression	2.36	1.91
N		3	5
Grade 5			
	Reading Vocabulary	4.78	3.70
	Reading Comprehension	5.57	5.20
	Language Mechanics	4.20	3.58
	Language Expression	3.00	2.80
N		4	10
Grade 6			
	Reading Vocabulary	4.32	5.39
	Reading Comprehension	5.72	6.22
	Language Mechanics	5.66	6.04
	Language Expression	5.22	5.43
N		3	3

Appendix A

Index of Reading Awareness

DIRECTIONS: Read each of the questions and the answers that follow them. CIRCLE the letter of YOUR ANSWER to each question.

1. What is the hardest part about reading for you?

   a. Sounding out the hard words.
   b. When you don't understand the story.
   c. Nothing is hard about reading for you.

2. What would help you become a better reader?

   a. If more people would help you when you read.
   b. Reading easier books with shorter words.
   c. Checking to make sure you understand what you read.

3. What is special about the first paragraph in a story?

   a. They always begin with "Once upon a time..."
   b. The first sentences are the most interesting.
   c. They often tell what the story is about.

4. What is important about the main character in the story?

   a. The main character is the one who solves the problem of the story.
   b. The main character is the person or animal the story is mostly about.
   c. The main character is the hero of the story.

5. How can you tell which sentences are the most important ones in a story?

   a. They're the ones that tell the most about the characters and what happens.
   b. They're the most interesting ones.
   c. All of them are important.

6. If you could only read some of the sentences in the story because you were in a hurry, which ones would you read?

   a. Read the sentences in the middle of the story.
   b. Read the sentences that tell you the most about the story.
   c. Read the interesting, exciting sentences.

7. When you tell other people about what you read, what do you tell them?

   a. What happened in the story.
   b. The number of pages in the book.
   c. Who the characters are.

8. If the teacher told you to read a story to remember the general meaning, what would you do?

   a. Skim through the story to find the main parts.
   b. Read all of the story and try to remember everything.
   c. Read the story and remember all of the words.

9. Before you start to read, what kind of plans do you make to help you read better?

   a. You don't make any plans. You just start reading.
   b. You try to remember the meaning of the new vocabulary words.
   c. You think about what the story is going to be about.

10. How does knowing the new vocabulary words help you when you read the story?

    a. Knowing the new vocabulary words helps you understand the parts of the story that use new words.
    b. Knowing the new words helps you predict what will happen in the story.
    c. Knowing the new vocabulary words helps you predict what will happen in the story, and they help you understand the story.

11. What would you do if you couldn't answer a question about the story?

    a. Ask your partner what the answer is.
    b. Talk to your partner and skim the story to find the answer.
    c. Skip that question and then discuss it in reading group.

12. Why would you go back and read things over again?

a. Because it is good practice.
b. Because you didn't understand it.
c. Because you forgot some words.

13. What do you do if you come to a word and you don't know what it means?

a. Use the words around it to figure it out.
b. Ask someone else.
c. Go on to the next word.

14. What do you do if you don't know what a whole sentence means?

a. Read it again.
b. Sound out all of the words.
c. Think about the other sentences in the paragraph.

15. If you were reading silently and didn't understand a paragraph, what would you do?

a. Read the next paragraph to help you understand the last one.
b. Reread the paragraph before going on to the next paragraph.
c. Read to the end of the story before rereading parts of the story.

16. If you are reading a story for fun, what would you do?

a. Look at the pictures to get the meaning.
b. Read the story as fast as you can.
c. Imagine the story like a movie in your mind.

17. If you are reading a factual story, what would you do to remember the information?

a. Ask yourself questions about the important ideas.
b. Skip the parts you don't understand.
c. Reread the whole story.

18. If you are reading for a test, which would help the most?

a. Read the story as many times as possible.
b. Talk about it with somebody to make sure you understand it.
c. Say the sentences over and over.

19. If you are reading a library book to write a book report, which would help you the most?

a. Sound out words you don't know.
b. Write it down in your own words.
c. Skip the parts you don't understand.

20. Which of these is the best way to remember a story?

a. Say every word over and over.
b. Think about remembering it.
c. Write it down in your own words.

Appendix B

Attitude Questionnaire

Here is a list of some of the subjects you study in school.

Reading Social Studies Math Science Writing/Language Arts

1. Write down the names of the three subjects you LIKE THE MOST on the lines below. Write the name of your FAVORITE one FIRST.

1 _____ 2 _____

3 _____

2. Write down the names of the three subjects that YOU ARE BEST AT on the lines below. Write the name of your VERY BEST subject FIRST.

1 _____ 2 _____

3 _____

3. Circle the words that show HOW MUCH YOU LIKE each of these subjects.

Math:	I like it a lot.	I like it a little.	I don't like it.
Social Studies:	I like it a lot.	I like it a little.	I don't like it.
Reading:	I like it a lot.	I like it a little.	I don't like it.
Writing (Language Arts)	I like it a lot.	I like it a little.	I don't like it.
Science:	I like it a lot.	I like it a little.	I don't like it.

4. Circle the words that show HOW GOOD YOU ARE in each of these subjects.

Reading:	I am really good at this.	I do all right at this.	I am not very good at this.
Science:	I am really good at this.	I do all right at this.	I am not very good at this.
Writing/ (Language Arts)	I am really good at this.	I do all right at this.	I am not very good at this.
Social Studies	I am really good at this.	I do all right at this.	I am not very good at this.
Math:	I am really good at this.	I do all right at this.	I am not very good at this.